

Having described the invention, the following is claimed:

1. A heart valve prosthesis comprising:

a valve member having an inflow end, an outflow end, and a generally cylindrical sidewall portion extending between the inflow end and the outflow end, the valve member including at least one leaflet moveable relative to the sidewall portion to provide for substantially unidirectional flow of fluid through the valve member;

a support of a substantially flexible material positioned around the sidewall portion; and

a strip of pliant material around valve member intermediate the inflow end and the outflow end of the valve member in a generally overlying relationship with the support; and

a covering over a radially outer exposed surface of at least the strip.

2. The prosthesis of claim 1, wherein the strip comprises at least one of a natural material and a synthetic material.

3. The prosthesis of claim 1, wherein the strip comprises a biological tissue material.

4. The prosthesis of claim 1, further comprising a sheath of a flexible material that covers the support and at least a substantial portion of an exterior

part of the sidewall of the valve member, the sheath being interposed between the support and the strip.

5. The prosthesis of claim 4, wherein the covering further comprises a length of the sheath folded axially over another portion of the sheath that covers the support to form a fold seam adjacent the inflow end of the valve member, the length of the sheath extending from the fold seam over the strip such that an end thereof terminates at a location adjacent an outflow end of the support.

6. The prosthesis of claim 5, wherein at least the covering is attached relative to the valve member to inhibit at least axial movement of the strip relative to the valve member.

7. The prosthesis of claim 4, wherein the sheath comprises a biological tissue material.

8. The prosthesis of claim 1, wherein the support is positioned around the sidewall portion of the valve member intermediate the inflow end and the outflow end of the valve member, such that an inflow end of the support is spaced apart from the inflow end of the valve member and an outflow end of the support is spaced apart from the outflow end of the valve member.

9. The prosthesis of claim 8, wherein the outflow end of the sidewall portion of the valve member includes alternating peaks and sinuses, the outflow end of the sheath configured to follow the contour of the sinuses of the valve member

10. The prosthesis of claim 1, further comprising an outflow extension operatively associated with each of a plurality of commissures proximal an outflow end of the valve member.

11. The prosthesis of claim 10, further comprising a sheath of a flexible material that covers the support and at least a substantial portion of an exterior part of the sidewall of the valve member, the outflow extensions being formed as outflow extending portions of the sheath that extend a predetermined distance beyond each of the plurality of commissures proximal the outflow end of the valve member.

12. The prosthesis of claim 1, wherein the valve member further comprises one of a homograft and a xenograft that includes at least two leaflets extending from a valve wall portion corresponding to the sidewall portion.

13. A heart valve prosthesis comprising:

a heart valve comprising:

a generally cylindrical sidewall portion extending between an inflow end and an outflow end; and

at least one leaflet located within the sidewall portion, the at least one leaflet being moveable relative to the sidewall portion to provide for substantially unidirectional flow of blood through the heart valve;

a support apparatus around the sidewall portion and positioned axially between the inflow end and the outflow end of the sidewall portion;

a strip of pliant material around the sidewall portion of the heart valve intermediate the inflow end and the outflow end of the sidewall portion and extending radially outwardly beyond a radially outer surface of the support; and

a pliable covering over the strip and attached relative to the heart valve to inhibit axial movement of the strip relative to the heart valve.

14. The prosthesis of claim 13, further comprising an outflow extension operatively associated with each of a plurality of commissures of the heart valve proximal an outflow end of the sidewall portion of the heart valve.

15. The prosthesis of claim 10, further comprising a sheath of a flexible material that covers the support and at least a substantial portion of an exterior part of the sidewall of the heart valve, the outflow extensions being formed as outflow extending portions of the sheath that extend a predetermined distance beyond each of the plurality of commissures of the heart valve proximal the outflow end of the sidewall portion of the heart valve.

16. The prosthesis of claim 13, wherein the support comprises a flexible material having a radial thickness of less than about 0.5 mm.

17. The prosthesis of claim 13, further comprising a sheath of a flexible material interposed between the support and the strip, the sheath covering the support and at least a substantial part of the sidewall portion of the heart valve, the sheath having an inflow extending portion folded axially over a portion of the sheath that covers the support to define a fold seam adjacent the inflow end of the sidewall portion of the heart, a length of the sheath extending from the fold seam over the strip such that an end thereof terminates at a location adjacent an outflow end of the support.

18. The prosthesis of claim 17, wherein the sheath is secured relative to the heart valve to inhibit axial movement of the strip relative to the heart valve.

19. The prosthesis of claim 17, wherein the sheath comprises a biological tissue material.

20. The prosthesis of claim 17, wherein an outflow end of the support is sinusoidal with peaks extending from a generally annular base portion corresponding to a contour of the outflow end of the sidewall portion of the heart valve, such that the peaks of the support are substantially aligned with corresponding commissures of the heart valve.

21. A heart valve prosthesis, comprising:

valve means for permitting substantially unidirectional flow of blood through a generally cylindrical sidewall portion thereof;

means for helping support the sidewall portion, the means for helping support being disposed around the sidewall portion of the valve means;

means for coving the means for helping support and for inhibiting axial movement of the means for helping support relative to the valve means;

means for providing a pliant substrate for receiving sutures at a location axially spaced from an inflow end of the prosthesis and generally circumscribing the means for helping support; and

means for coving the means for providing a substrate and for inhibiting axial movement of the means for providing a substrate relative to the valve means.

22. The prosthesis of claim 21, further comprising means for inhibiting inward deflection of commissures at an outflow end of the sidewall portion of the valve means when attached to surrounding tissue, the means for inhibiting extending axially beyond the outflow end of the sidewall portion of the valve means.